VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Claims 51, 52, 59, 60, 67-86, 89, 90, 99, 100, 107, 114, 116, 117 and 124 have been cancelled.

The claims have been amended as follows:

61. (Twice Amended) The disk drive of claim 57, wherein the detection circuit includes a transition detector and a counter, and an output of the transition detector is coupled to an input of the counter.

94. (Twice Amended) The disk drive of claim 87, wherein the detection circuit includes a transition detector, a counter, and a memory, an output of the transition detector is coupled to an input of the counter, and outputs of the counter and the memory are coupled to an output of the detection circuit.

104. (Twice Amended) The disk drive of claim 97, wherein the detection circuit includes a transition detector, a counter, and a memory, an output of the transition detector is coupled to an input of the counter, and outputs of the counter and the memory are coupled to an output of the detection circuit.

REMARKS

Claims 47-50, 53-58, 61-66, 87, 88, 91-98, 101-106, 108-113, 115, 118-123, 125 and 126 are pending. In this Response, claims 61, 94 and 104 have been amended, and claims 51, 52, 59, 60, 67-86, 89, 90, 99, 100, 107, 114, 116, 117 and 124 have been cancelled.

I. SECTION 112, FIRST PARAGRAPH REJECTIONS

Claims 47-50, 53-58, 61-66, 87, 88, 91-98, 101-106, 108-113, 115, 118-123, 125 and 126 are rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors at the time the application was filed had possession of the claimed invention.

The Examiner asserts that "Each of the independent claims set forth a detection circuit that determines whether the head is within an acceptable flying height range independently of flying height data obtained from the disk drive at 'other than the substantially constant flying height', claim 87 or at 'a predetermined flying height', claim 97."

The Examiner also asserts that "when determining if a flying height is within an acceptable range that the determination is dependent upon known values (threshold or calibration) obtained from at least a maximum flying height. Therefor the language as pointed out in independent claims 87 and 97 is not supported by the written disclosure." The Examiner also refers to specification at pages 21 and 28.

The remaining claims in this case are directed to a detection circuit that determines whether the head is within an acceptable flying height in response to first and second data patterns, wherein the first data pattern has a first frequency, and the second data pattern has a second frequency that is higher than the first frequency.

The specification illustrates an implementation of this approach in an embodiment as follows:

> In general, the invention determines a read signal resolution value, or a read signal resolution related value, and then compares the value to a <u>predetermined</u> value to determine whether the flying height is in the proper range. (Page 4, lines 8-12) (Emphasis added).
>
> In one aspect of the present invention, a disk drive is provided that comprises a disk having a first data pattern with a first frequency and a second data pattern with a second, higher frequency on a first track. The disk drive also includes means for reading the first and second data patterns, using a head at a first vertical distance from the disk, to create first and second analog signal portions, respectively. In addition, the disk drive includes a determination unit for determining whether the first vertical distance of the head is within an acceptable range for performing a transfer of user data between the first track and an exterior environment using the first analog signal portion and the second analog signal portion, wherein <u>the determination unit does not require the movement of the head to a substantially different vertical distance to make the determination</u>. (Page 4, line 13 to page 5, line 2) (Emphasis added).
>
> To detect flying height variations in real time, the present invention relies upon variations in read signal resolution with flying height. Read signal resolution is a performance measurement that is related to the disk drive's ability to read information at different frequencies. In this regard, read signal resolution is generally calculated using the ratio of the magnitudes of two analog read signal portions having different frequencies. For example, to measure read signal resolution, a burst having a first frequency can be read from the disk surface to create a first analog signal portion and then a burst having a second, higher frequency can be read from the disk surface to create a second analog signal portion. The read signal resolution can then be calculated based upon the ratio of the magnitude of the second signal portion to the magnitude of the first signal portion. <u>To maintain an accurate resolution measurement, both bursts have to be read at substantially the same head flying height</u>. (Page 16, line 21 to page 17, line 11) (Emphasis added).

> The apparatus 50 includes: AGC circuitry 51, a magnitude detector 52, a register 54, a resolution measurement unit (RMU) 56, a comparator 58, and a random access memory (RAM) 60. As illustrated in Fig. 5, the apparatus 50 receives the analog read signal from the head 18 at an input 62. The AGC circuitry 51 receives the analog read signal from input 62 and normalizes the magnitude of other portions of the read signal to the magnitude of the AGC portion of the signal. The AGC circuitry 51 then delivers the processed read signal to the magnitude detector 52 and to other circuitry in the channel. Under the control of the controller 26, the magnitude detector 52 first measures the magnitude of the AGC portion of the analog signal. The magnitude of the AGC portion is then delivered to the register 54, under the control of the controller 26, where it is stored for later use. The magnitude detector 52 then measures the magnitude of the C/D portion of the analog read signal. The magnitude of the C/D portion and the stored magnitude of the AGC portion are next delivered to the RMU 56 for calculation of the read signal resolution. <u>The resulting read signal resolution value is then compared, in comparator 58, to a threshold resolution value, stored in RAM 60, corresponding to the portion of the disk 14 being accessed.</u> The threshold values stored in the RAM 60 represent the read signal resolutions at the maximum head flying heights that will result in an acceptable performance of the disk drive system 10. Each value stored in the RAM 60 corresponds to a different area on the disk surface (such as, for example, a different zone, track, or sector.) The output of the comparator 58, therefore, is indicative of whether the present flying height of the head 18 is adequate for the performance of a read and/or write operation. (Page 20, line 18 to page 21, line 22) (Emphasis added).

Thus, the specification makes abundantly clear that in this embodiment the flying height determination occurs while the head is at a substantially constant flying height by comparing a read signal resolution value, responsive to a ratio of read signals from the first and second data patterns, to a predetermined threshold resolution value stored in RAM. The specification does not somehow require that the predetermined threshold resolution value be flying height data obtained from the disk drive at another flying height or a predetermined flying height. For instance, the predetermined threshold resolution value can be calculated long before the disk drive is manufactured and then stored in the disk drive while the disk drive is manufactured.

Likewise, the specification does not somehow require that the calibration values discussed at page 28 be flying height data obtained from the disk drive at another flying height or a predetermined flying height.

Based on the foregoing, Applicant respectfully submits that the specification conveys that the inventors contemplated all of the features in claim 87 and 97, including a detection circuit that determines whether the head is within an acceptable flying height range while the head is at a substantially constant flying height and independently of flying height data obtained from the disk drive (1) at other than the substantially constant flying height and (2) at a predetermined flying height.

Therefore, Applicant respectfully requests that these rejections be withdrawn.

II. SECTION 102 REJECTIONS – BROWN ET AL.

Claims 87, 88, 93, 97, 98, 103, 110, 111, 120 and 121 are rejected under 35 U.S.C. § 102(b) as being anticipated by *Brown et al.*

Brown et al. discloses an apparatus for calculating flying height. The flying height calculation involves taking a first measurement where the first flying height is sought, a second measurement at a predetermined reference height (such as zero clearance), and performing a calculation based on these measurements. For instance, a first measurement (or reference measurement) is taken at a zero clearance, defined as where the slider contacts the disk, a second measurement at a different flying height is then taken, and the change in flying height occurring between the first and second measurements is then calculated.

In a first embodiment, a single signal of constant periodicity is written over a predetermined area of the recording medium, a first signal is sensed at a first flying height from the predetermined area, the flying height is reduced to a second flying height of substantially zero, a second signal is sensed at the second flying height, and the first flying height is calculated

as a ratio, expressed in decibels, of the first and second signals times the wavelength divided by a constant (col. 2, lines 31-42).

In a second embodiment, a plurality of signals of constant periodicity are written over the predetermined area of the recording medium, first and second signals with first and second wavelengths are simultaneously sensed at the first flying height, the flying height is reduced to a second flying height of substantially zero, third and fourth signals with the first and second wavelengths are simultaneously sensed at the second flying height, and the first flying height is calculated as a constant times the product of two terms. The first term is the product of the two wavelengths divided by the difference between the two wavelengths, and the second term is the ratio of the first and second signals, expressed in decibels, subtracted from the ratio of the third and fourth signals, expressed in decibels (col. 2, lines 43-58).

In a third embodiment, at least one signal of constant periodicity is written over the predetermined area so that the readback signal has a spectral content comprising a plurality of different frequencies, first and second signals with first and second wavelengths are simultaneously sensed at the first flying height, the flying height is reduced to a second flying height of substantially zero, third and fourth signals with the first and second wavelengths are sensed at the second flying height, and the first flying height is calculated as the product of two terms. The first term is a constant times a velocity divided by the difference in frequency between the first and second signals. The second term is the difference of the ratio, expressed in decibels, of the first and second signals at the first and second wavelengths and the ratio, expressed in decibels, of the third and fourth signals at the first and second wavelengths (col. 2, line 59 to col. 3, line 14).

Brown et al. discloses that the predetermined area of the disk where the signal is recorded is preferably a part of landing area tracks 42 and 44 but could as well be in one of the data track areas 46 or 48. *Brown et al.* also discloses that the dual-wavelength method requires recording two magnetic wavelengths either on adjacent tracks or preferably interleaved on one track or track segment.

Claim 87 recites "a detection circuit that determines whether the head is within an acceptable flying height range in response to the first and second data patterns while the head is at a substantially constant flying height and independently of flying height data obtained from the disk drive at other than the substantially constant flying height."

Claim 97 recites "a detection circuit that determines whether the head is within an acceptable flying height range in response to the first and second data patterns while the head is at a substantially constant flying height and independently of flying height data obtained from the disk drive at a predetermined flying height."

Brown et al. calculates the flying height by adjusting the clearance of the slider over the disks to a reference clearance, such as zero clearance. The reference fly height values known by the previous determination are obtained by adjusting the flying height to a known reference value (such as zero clearance) that is different than the unknown flying height, and the reference flying height values are used to calculate the unknown flying height. Claims 87 and 97 explicitly preclude this approach.

The Examiner admitted in the parent case that "Brown et al. does not require movement of the head to a substantially different vertical distance to determine whether the 'unknown' vertical distance is within an acceptable range since the reference fly height values are already known by a previous determination." (Office Action dated June 5, 1998, page 8, lines 6-9.)

For this reason alone, claims 87 and 97 clearly distinguish over *Brown et al.*

Claims 87 and 97 also recite that "the first and second data patterns are located in separate non-overlapping circumferential portions of the first track."

Brown et al. fails to disclose first and second signals with first and second frequencies used for fly height detection be placed in separate non-overlapping circumferential portions of a track. Instead, the first and second signals are either placed on adjacent tracks or are interleaved with on another on a track.

In sustaining this rejection, the Examiner states that "Brown et al. teaches in column 7 that two distinct frequency signals can be recorded on a single track which are then read to form a readback ratio that is then compared to a zero clearance value to determine if a head is within an acceptable flying height. This discussion satisfies all the limitations as set forth in claims 87, 93, 97 and 103." Applicant disagrees. The Examiner has not even attempted to address the limitations discussed above.

Although more distinctions can be drawn with *Brown et al.*, Applicant has already described claim features that *Brown et al.* fails to teach or suggest, and in some instances would render *Brown et al.* unsatisfactory for its intended purpose.

Under 35 U.S.C. § 102, anticipation requires that each and every element of the claimed invention be disclosed in the prior art. *Akzo N.V. v. United States International Trade Commission*, 1 USPQ 2d 1241, 1245 (Fed. Cir. 1986), *cert. denied*, 482 U.S. 909 (1987). That is, the reference must teach every aspect of the claimed invention. M.P.E.P. § 706.02. Anticipation cannot be sustained by ignoring claim elements.

Therefore, Applicant respectfully requests that these rejections be withdrawn.

III. SECTION 103 REJECTIONS – BROWN ET AL. AND GYI ET AL.

Claims 92, 102, 108, 109, 112, 115, 118, 119, 122, 125 and 126 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Brown et al.* in view of *Gyi et al.* (U.S. Patent No. 4,146,911). Applicant respectfully submits that these rejections are moot for the reasons given above.

IV. CONCLUSION

In view of the amendments and remarks set forth herein, the application is believed to be in condition for allowance. Should any issues remain, the Examiner is encouraged to telephone the undersigned attorney.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on April 27, 2001. D Sigmond 4/27/01 David M. Sigmond, Attorney for Applicant — Date of Signature

Respectfully submitted,

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